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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,356	05/01/2001	Masayuki Mishima	Q64324	2603

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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

6

DATE MAILED: 01/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-6

Office Action Summary

Application No.

09/845,356

Applicant(s)

MISHIMA, MASAYUKI

Examiner

Marie R. Yamnitzky

Art Unit

1774

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

1. This Office action is in response to applicants' amendment received 11/22/02 (Paper No. 5), which cancels claim 9, amends claims 1-8 and 10-15, and adds claims 16 and 17.

Claims 1-8 and 10-17 are pending.

2. The rejections under 35 U.S.C. 112, second paragraph, 35 U.S.C. 102(b) and 35 U.S.C. 102(e) as set forth in Paper No. 4 are overcome by applicants' amendment.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-8 and 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldo et al. in *Appl. Phys. Lett.* 75(1), pp. 4-6 (July 5, 1999) or Forrest et al. (US 6,310,360 B1), either reference in view of Egusa et al. (US 5,294,810).

Baldo et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer containing two light emitting materials, and a cathode. See the whole reference. In various devices, the light-emitting layer contains Ir(ppy)₃ and CBP. Baldo et al. also disclose a device in which the light-emitting layer contains Ir(ppy)₃ and Alq₃.

Forrest et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer/zone containing three light emitting materials, and a cathode. See the entire patent to Forrest et al. In particular, see Fig. 1, Fig. 3, column 9, line 1 - c. 11, l. 60, c. 12, l. 58 - c. 13, l. 50, c. 14, l. 63 - c. 15, l. 17 and c. 17, l. 9 - c. 19, l. 19. Note that c. 11, l. 57 contains an error in that λ for Ir(ppy)₃ should read --~500 nm-- rather than “~400 nm”. In Forrest’s Example 1, the light-emitting layer consists of an alternating series of layers of CBP doped with Ir(ppy)₃ and CBP doped with DCM2.

“CBP” stands for 4,4'-N,N'-dicarbazole-biphenyl, which is a blue light-emitting material having a light-emitting wavelength peak of about 400 nm. CBP also meets the limitation of the host material required by claim 8; CBP being a carbazole, an arylamine and an aromatic tertiary amine compound.

“Ir(ppy)₃” stands for *fac* tris(2-phenylpyridine) iridium, which is a green light-emitting orthometallated complex of iridium having a light-emitting wavelength peak of about 500 nm.

“Alq₃” stands for tris-(8-hydroxyquinoline) aluminum, which is a green light-emitting material. Alq₃ also meets the limitation of the at least one compound required by claim 7 and the host material required by claim 8; Alq₃ being a metal complex of 8-quinolinol.

“DCM2” is the abbreviation for a pyran compound that is a red light-emitting compound having a light-emitting wavelength peak of about 590 nm (the full name is given at c. 4, l. 56-58 and the formula is shown at the bottom of c. 9 of the patent to Forrest et al.). DCM2 also meets the limitation of the at least one compound required by claim 7.

Each of Baldo's devices having a light-emitting layer comprising Ir(ppy)_3 in CBP or Ir(ppy)_3 in Alq_3 contains the Ir(ppy)_3 in an amount within the scope of claim 6.

In Forrest's device of Example 1, each of the layers of CBP doped with Ir(ppy)_3 contains Ir(ppy)_3 in an amount within the scope of claim 6.

Baldo's devices having the layer structure depicted in Baldo's Fig. 1 have an organic compound layer having a total thickness within the range set forth in claim 13 ($860 \text{ \AA} = 0.086 \text{ }\mu\text{m}$). Baldo's device having a layer structure similar to that depicted in Fig. 1 but without a BCP barrier layer also has an organic compound layer having a total thickness (800 \AA) within the range set forth in claim 13.

Forrest's device of Example 1 has an organic compound layer having a total thickness within the range set forth in claim 13 ($1200 \text{ \AA} = 0.12 \text{ }\mu\text{m}$).

With respect to the process limitations recited in claims 14 and 15, product-by-process claims are not limited to the method steps recited in the claims, only to the structure implied by the steps. In the present case, the only structure implied by the steps recited in claims 14 and 15 is a layer, and the prior art references anticipate that structure.

While the devices of Baldo et al. or Forrest et al. meet various limitations of the presently claimed device, the prior art devices do not anticipate the presently claimed device which is a "white light-emitting" device. The devices disclosed by Baldo et al. or Forrest et al. do not emit white light.

Baldo et al. also do not disclose a device comprising at least two different light-emitting layers as required by claim 3, do not disclose the combination of light-emitting materials as

required by claim 10 and by claim 11, do not disclose all of the numerous materials within the scope of claim 7 and within the scope of claim 8, and do not disclose all of the transparent substrates within the scope of claim 12.

Forrest et al. also do not disclose the combination of light-emitting materials as required by claim 11, do not disclose all of the numerous materials within the scope of claim 7 and within the scope of claim 8, and do not disclose all of the transparent substrates within the scope of claim 12.

It was known in the art at the time of the invention that the color of light emitted by a light-emitting device can be controlled by the selection of light-emitting materials used in the device, and that emission of white light can be achieved by providing an appropriate combination of light-emitting materials.

Egusa et al. disclose light-emitting devices, teach that a light-emitting device may comprise more than one light-emitting layer (e.g. see column 11, line 40 - c. 12, l. 60 and c. 19, l. 52 - c. 20, l. 61), teach that different light-emitting materials may be mixed in a light-emitting layer in order to control light-emission wavelength and that the mixture may include a phosphorescent material emitting light from a triplet excited state (e.g. see c. 25, l. 36 - c. 27, l. 15), and teach that it is possible to achieve emission of white light from a device comprising multiple light-emitting layers and from a device comprising a mixture of light-emitting materials (e.g. see c. 20, l. 57-61 and c. 26, l. 15-28).

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to provide light-emitting devices similar to those disclosed by Baldo et al. or

Forrest et al. but utilizing different and/or additional light-emitting materials in combination with the iridium complex either in the same layer or in a light-emitting layer separate from the layer comprising the iridium complex. One of ordinary skill in the art would have been motivated to utilize different and/or additional light-emitting materials in combination with the iridium complex so as to provide a device having the advantages of using a phosphorescent material as taught by Baldo et al. or Forrest et al. while at the same time being able to modify the color of light emitted by the device as taught by Egusa et al. It would have been within the level of ordinary skill of a worker in the art at the time of the invention, as a matter of routine experimentation, to determine suitable and optimum combinations of light-emitting materials selected from known light-emitting materials so as to obtain a functional device capable of emitting light of the color(s) desired. One of ordinary skill in the art would have been motivated to select a combination of light-emitting materials capable of providing white light when the light-emitting device was intended to be used for an application where white light was desirable.

With respect to claim 12, it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to make devices similar to those taught by Baldo et al. or Forrest et al. but utilizing a transparent substrate made of a material other than glass. One of ordinary skill in the art would have been motivated to select a particular transparent substrate based on suitability for the intended use and based on advantages to be attained by the use of a particular substrate (e.g. based on factors such as cost, availability, durability, and the weight added to a final product by a particular substrate material).

5. Applicants' arguments filed 11/22/02 have been fully considered but they are not persuasive with respect to the rejection under 35 U.S.C. 103(a).

Applicants argue that Egusa is not directed to an orthometallated complex and only generically discloses organic dyes emitting phosphorescence. Applicants argue that there is no *prima facie* case of obviousness because there is no structural similarity and/or motivation.

The examiner notes that if Egusa disclosed an orthometallated complex, the rejection would be one of anticipation rather than obviousness (at least for claim 1).

While the secondary reference (Egusa) does not disclose an orthometallated complex, the primary references (Baldo et al. and Forrest et al.) do disclose an orthometallated complex. It is the examiner's position that a *prima facie* case of obviousness has been established. Each of the primary references and the secondary reference pertains to organic EL devices and each discloses that multiple light-emitting materials may be used in combination in an organic EL device. The primary references establish that an orthometallated complex as required in general by the present claims, and an orthometallated iridium complex of a tris(2-phenylpyridine) as specifically required by present claim 11, was known in the art at the time of the invention to be a suitable light-emitting material for an organic EL device. The primary references establish that an orthometallated iridium complex of a tris(2-phenylpyridine) was known in the art at the time of the invention to be capable of exhibiting phosphorescent emission. The secondary reference establishes that it was known in the art at the time of the invention that organic EL devices that emit white light can be obtained by selecting an appropriate combination of light-emitting materials. The secondary reference also establishes that it was known in the art at the time of the

invention that materials exhibiting phosphorescent emission can be used in a mixture of light-emitting materials when making an organic EL device.

The motivation to combine the references lies in the advantages to be attained by the use of the orthometallated iridium complex as taught by either primary reference while being able to modify the color of light emitted from the device as taught by the secondary reference.

6. Miscellaneous:

In line 7 of claim 8, a comma should be inserted after “distyrylpyradine”.

In line 5 of claim 10, “470” should apparently read --570-- (see original claim 10).

In line 2 of claim 17, “have” should read --has--.

7. The reference made of record and not relied upon is considered pertinent to applicants' disclosure.

D' Andrade et al. (US 2002/0197511 A1) is not available as prior art, but is of interest as disclosing related subject matter and having an effective U.S. filing date close to (about two weeks after) the U.S. filing date of the present application.

8. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Art Unit: 1774

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (703) 308-4413. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax numbers for Art Unit 1774 are (703) 872-9311 for official after final faxes and (703) 872-9310 or (703) 305-5408 for all other official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (703) 872-9041.)

MRY
01/09/03



MARIE YAMNITZKY
PRIMARY EXAMINER

1774